# *Army's Need for a Configuration Management Data Interface Standard*

*Presented to Panel 5*

MIL-STD – 2549 & Rev. A – CM Implementation Issues

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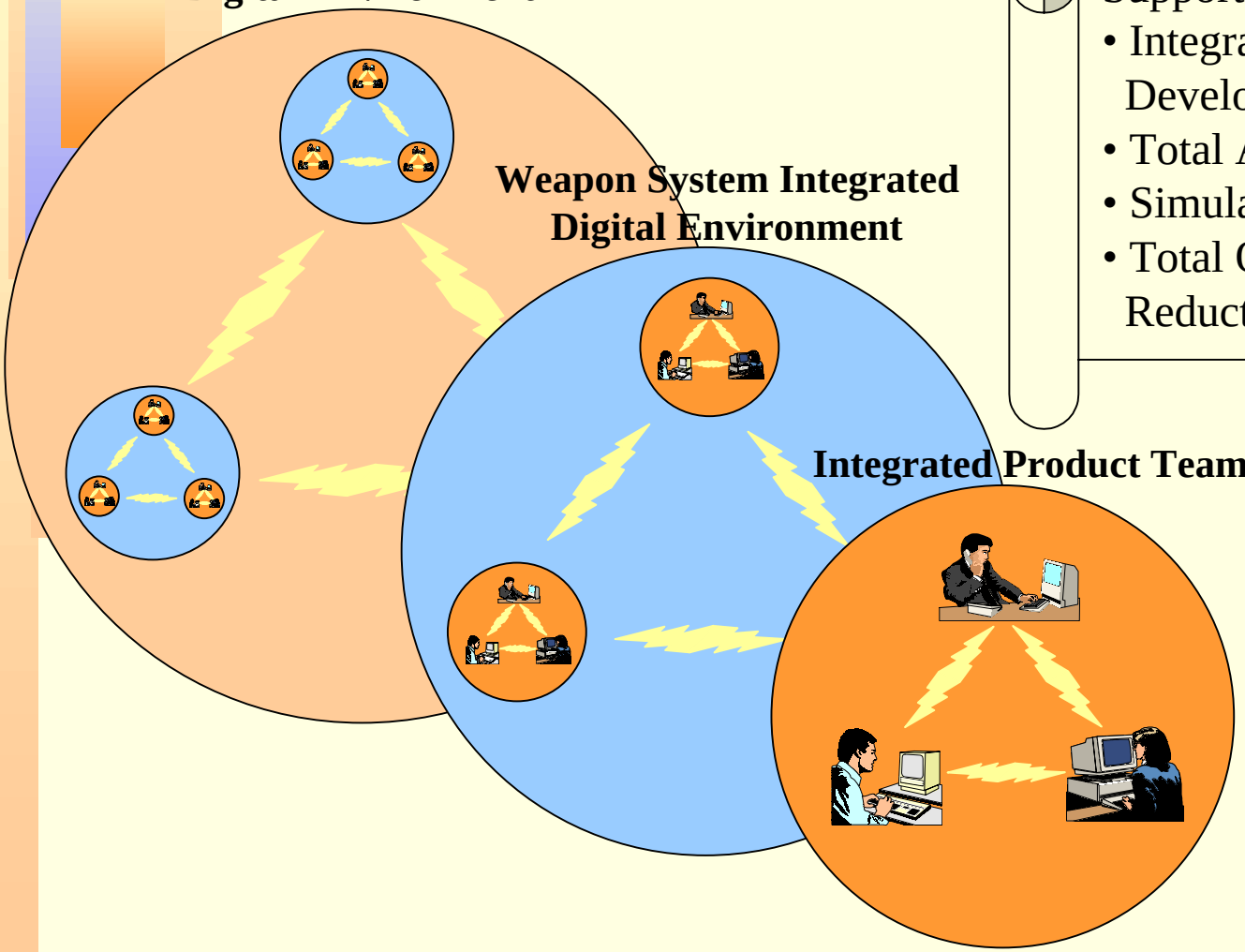
# *Purpose*

*To present the Army's need for Configuration Management and data interface standards, particularly MIL-STD-2549, and to establish the role this standard plays in meeting our vision for Integrated Digital Environments (IDEs).*

# *Presentation Outline*

- *Future IDE Functionality*
- *Configuration Management Functionality*
- *Need for Data Interface Standards (MIL-STD-2549)*
- *Conclusions*

# *Vision for a Future Enterprise IDE*




Supports:

- Integrated Product & Process Development (IPPD)
- Total Asset Visibility (TAV)
- Simulation Base Acquisition
- Total Ownership Cost Reduction (TOCR)

# *Functions we want to Automate & Integrate in an IDE*

- *Program Management*
  - *Program Planning*
  - *Program Control*
- *Systems Engineering*
  - *Requirements Analysis*
  - *Design Synthesis*
  - ***Configuration & Data Management***
  - *Systems Analysis & Control*
  - *Performance Verification*
- *Manufacturing & Production*
  - *Industrial Base Assessment*
  - *Production Planning*
  - *Manufacturing*
  - *Quality Control*
- *Logistics Support*
  - *Supportability Planning*
  - *Provisioning*
  - *Spares Ordering & Inventory*
  - *Field Maintenance*
- *Test & Evaluation*
  - *Test Planning*
  - *Testing*
  - *Evaluation & Analysis*
  - *Feedback to Design*
- *Procurement/Contract Mgmt*
  - *Solicitation Preparation*
  - *Proposal Evaluation / Source Selection*
  - *Contract Award*
  - *Contract Administration*
- *Business & Financial Mgmt*
  - *Financial Planning*
  - *Budgeting*
  - *Funds Execution*

# *Focus on one IDE function as an example: Configuration Management (CM)*

## *DOD Requirements (DOD Reg 5000.2-R)*

- *Establish and maintain a CM process to control the system products, processes and related documentation.*
- *The CM effort includes identifying, documenting, and verifying the functional and physical characteristics of the item; recording the configuration of the item, and controlling changes to an item and its documentation.*
- *The CM process shall provide a complete audit trail of decisions and design modifications.*
- *An integrated data management system shall be used to capture and control the technical baseline, provide data correlation and traceability among requirements, designs, decisions, rationale, and support configuration procedures.*

## *Army Requirements (AR 70-1)*

- *PMs and Materiel Developers are responsible for CM for their items.*

# *Configuration Management Options*

*Someone has to do it!*

*Two options:*

- *In-house - Government stores the product data and configuration manages it.*
- *Contract out - Contractor stores and retains control of the system configuration throughout the lifecycle of the system (or contract, whichever comes first).*
  - *The government retains control of those changes that affect the performance and interface requirements of the performance specification, and lifecycle cost.*
  - *Contract option for contractor to deliver a current drawing package to the government, at the Government's option, with the right to procure the parts in the competitive market.*
  - *CM responsibility is shared, not abrogated!*

*Either way, the Government is doing CM!*

# *CM & Product Data Responsibility*

| | Current | 5 Yrs in the Future |
|---|---|---|
| Total # of CIs | | |
| # Gov't Detailed TDPs | 925,000 (90%) | 891,000 (87%) |
| # Gov't Perf Specs | 64,000 (6%) | 99,000 (10%) |
| # Commercial Items | 36,000 (4%) | 37,000 (3%) |

Gov't has and will continue to have a significant CM and Data Management workload!

# *Current Army CM & Product Data Statistics*

*AMC has:*

- *4 Technical Data/Configuration Management System (TD/CMS), 5 Joint Engineering Data Management Information Control System (JEDMICS) sites, and 2 Product Data Management systems*
- *9.6 Million images*
- *600,000 images added/yr (doesn't include ADCS projects)*
- *5,000 Engineering Change Proposals (ECPs) / yr*
- *8,500 spare parts reprocurements / yr*

# *Current Army Environment*

## Facts

- Army legacy digital product data is primarily stored in "unintelligent" raster format
- Contractors are developing "intelligent" data that cannot be managed by TD/CMS
- TD/CMS can't manage multiple product baselines
- JEDMICS technology can't be maintained
- CITIS implementations tend to be program unique (digital delivery of product data)

## Resulting Problems

- Forces new producers to "re-invent" lost data intelligence - geometry and metadata
- Army incurs additional cost for conversion of data to raster format
- Depots must rely on other unofficial data sources to support repair and modifications
- Replacement of data repository needed now
- Repetitive unique solutions are expensive and provide little interoperability

# *Analysis of Current Environment*

- *Army will have a CM responsibility & workload for the foreseeable future.*
- *Current automated system (TD/CMS) can't handle all user needs.*
  - *3-D file formats*
  - *Multiple Configuration Baselines*
  - *Data in different systems*
- *Army is evaluating alternatives to replace JEDMICS.*
- *Army is switching from a "drawing" to "product" perspective.*
- *Army is working to have access to all product data (not just the two dimensional images of record) required to support a product throughout its life cycle.*
- *Complete life cycle access to product data is only possible if the Army practices cradle-to-grave configuration management of product data.*

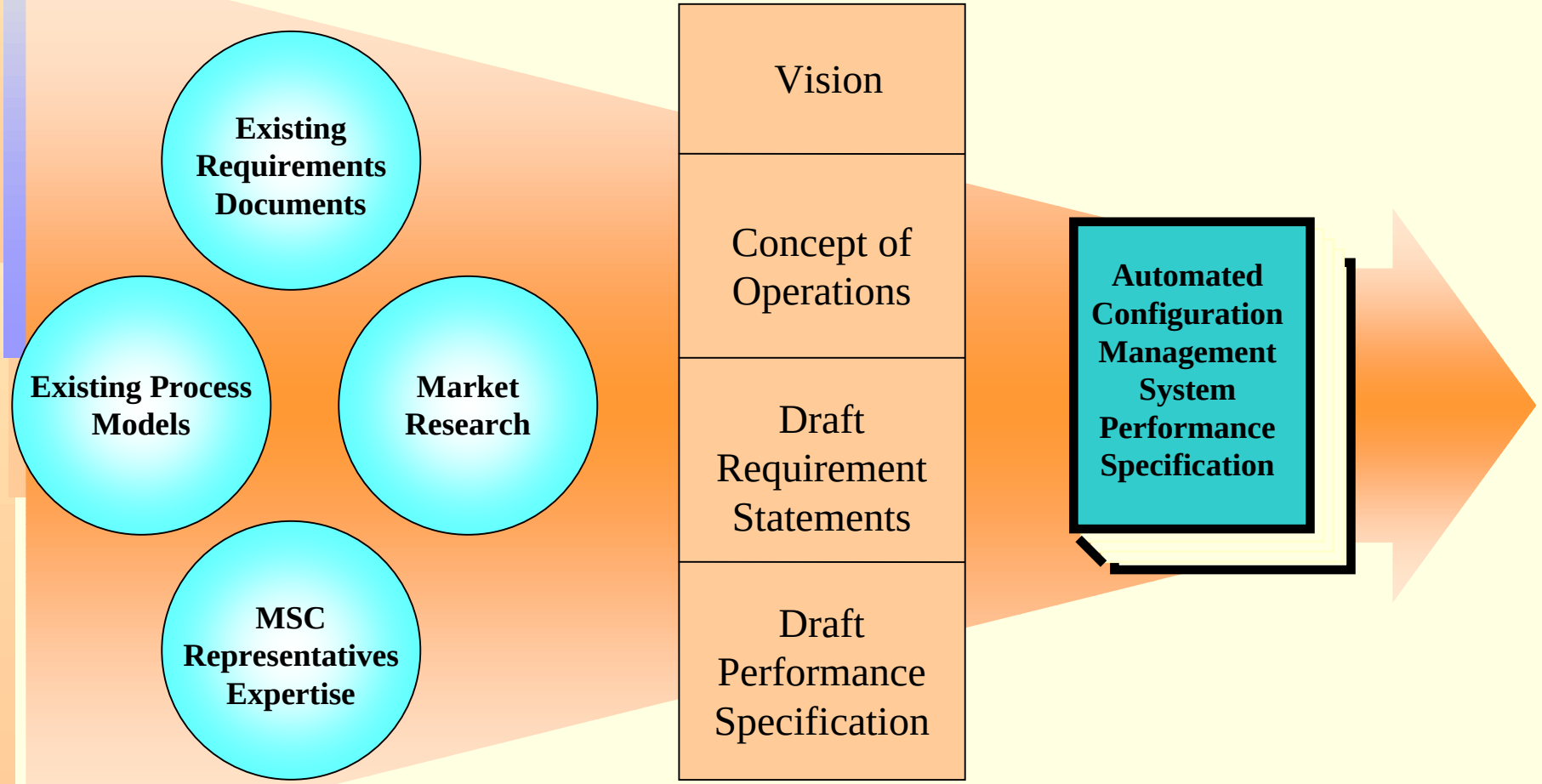
Other Services are doing similar things

# *Army Strategy*

*Pursuing an Automated Configuration Management System (ACMS) that:*

- *Knows about all product related data*
- *Can accept and manipulate product structures and "intelligent" data, and manage multiple product baselines*
- *Is compatible with Industry practices*
- *Supports Acquisition Reform objectives*
- *Uses Commercial-off-the-Shelf technology*
- *Provides a tool that is flexible and adaptable to meeting current and future business processes.*
- *Uses Web technology to provide widespread, inexpensive implementation*
- *Provides a standard means for the access/exchange of digital product data. Allows for interoperability between sites*

# *Process Used to Develop the ACMS Performance Specification*



# *Key Elements of ACMS Performance Specification*

- *Section 3 Requirements*
  - *Operational*
    - *Product Data Management*
    - *Configuration Management*
    - *Tech Loop*
  - *Interface*
    - *External*
    - *Internal (none)*
    - *User*
  - *Ownership and support*
  - *Operational Environment*
    - *Client workstation*
    - *Network*
    - *Server*

# *ACMS Operational Requirements*

## *Product Data Management*

- *Product Data Control*
- *Workflow Management*
- *Product Structure Management*
- *Program Management*
- *Imaging Services*
- *Data Translation*
- *System Administration*

## *Configuration Management*

- *CM Data exchange*
- *Configuration Planning*
- *Configuration Identification*
- *Configuration Audit*
- *Configuration Control*
- *Status Accounting*

## *Tech Loop*

- *Tech Loop Creation and Maintenance*
- *Support Tech Loop Reviews*
- *Generate Tech Loop Reports*

# *CM Data Exchange*

3.1.2.1 Configuration management data exchange requirements

3.1.2.1.1 Process data information packets. ACMS shall provide the capability to accept, create, validate, store, retrieve, modify, and archive data information packets as defined in MIL-STD-2549.

# *Configuration Planning*

3.1.2.2 Configuration planning requirements

3.1.2.2.1 Manage program management documents. ACMS shall provide the capability to identify, store, retrieve, and display Program Management documents in a vault. Program Management documents include Acquisition Strategy, Configuration Management Plans, Audit Plans, Interface Control Agreements and other documents

3.1.2.2.2 Determine contract data requirements. ACMS shall provide the capability to determine, record, and display the types of MIL-STD-2549 data information packets required as contract deliverables.

will provide data that identifies any backlog, bottleneck and errors.

# *External Interface*

3.2.1 External interface requirements

3.2.1.1 Process data information packets. For requirements pertaining to exchanging MIL-STD-2549 Data Information Packets, see 3.1.2.1.

3.2.1.5 Interface with MEARS. ACMS shall be capable of dynamic interface (see Appendix D) with the Multi-user Engineering Change Proposal Automated Review System (MEARS) to exchange engineering change actions and associated metadata.

3.2.1.6 Interface with ECALS. ACMS shall be capable of dynamic interface with the Engineering Changes at Light Speed (ECALS) system to exchange engineering change actions and associated metadata.

3.2.1.7 Interface with CARS. ACMS shall be capable of dynamic interface with the Computer Aided Requirements System (CARS) to exchange engineering change actions and associated metadata.

3.2.1.8 Interface with CCSS 404. ACMS shall be capable of batch loading data from the Commodity Command Standard System (CCSS) 404 application.

3.2.1.9 Interface with CCSS for DFARS Appendix E. ACMS shall be capable of batch loading data from CCSS for DFARS Appendix E Screening Questionnaire.

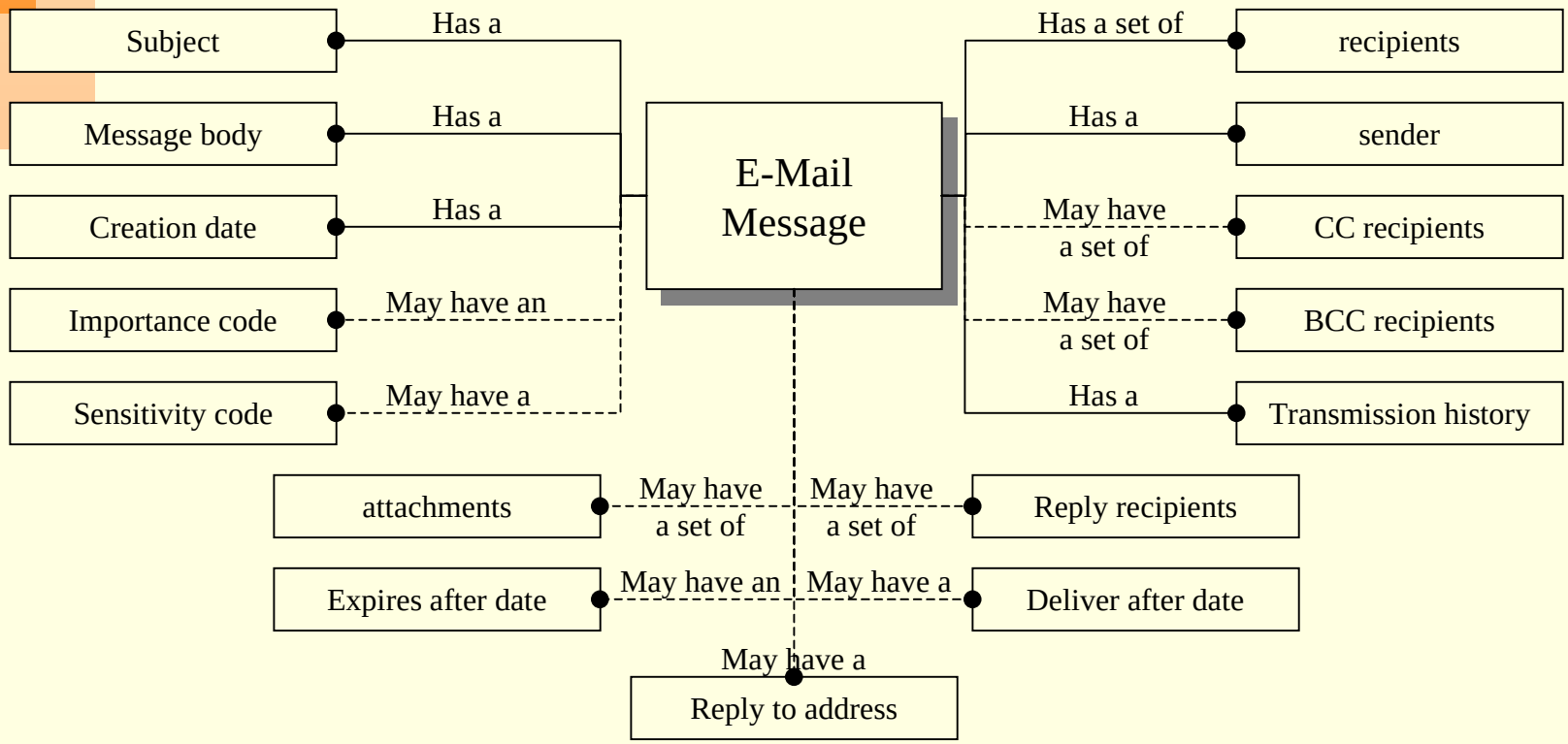
# *MIL-STD-2549*

*Features:*

- *Contains conceptual data model and data dictionary that captures Industry and Government CM business rules and data needs*
- *Recognizes that CM activities are industry independent*
- *Focuses on metadata for identity, relationship, version and retrieval attributes*
- *Works with STEP, IGES or other product data representation formats. Accommodates any document, any file, any format as "bucket of bits"*
- *Allows for transmittal of metadata and files or metadata alone*
- *Identifies/controls multiple representations*
- *Provides a complete set of transactions for maintaining a CM system*
- *The use of the MIL-STD-2549 model and data dictionary as a neutral basis to which many different systems can readily be mapped is viewed as an enormous cost saver.*

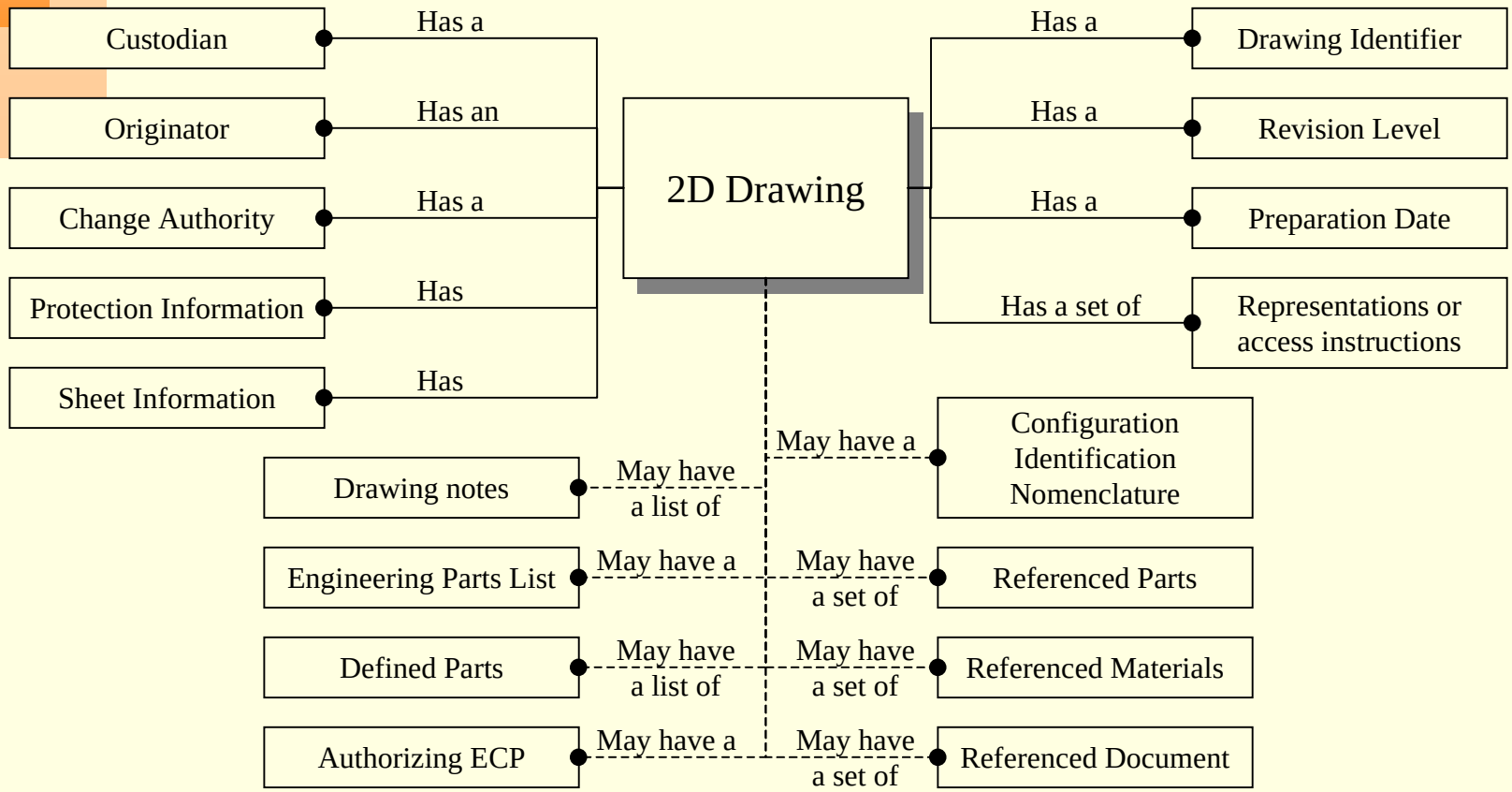
# *RFC-822, Standard for the Format of ARPA Internet Text Messages*

Example of the metadata that is sent in an e-mail message.



# *MIL-STD 2549 Data Information Packets*

*Example of the Configuration Management data delivered when delivering drawing representations or access instructions to the drawing representations is delivered using DIP 1A.*



# *Army Base Realignment And Closure Experience*

- *In 1996, when ATCOM was being closed, the Army was using*
  - *MIL-STD-973 internally and in its contracts*
  - *TD/CMS as its "standard" CM system*
- *Army spent $2.7M to move CM data from ATCOM to four other TD/CMS sites and has not totally completed the job*
  - *most money spent on data conversion*
- *Why so much money?*
  - *MIL-STD-973 did not contain a fully attributed data model and data element dictionary*
  - *Army sites used TD/CMS in different ways which resulted in*
    - *different data elements being used*
    - *different data element field sizes being used*
    - *different codes or code definitions being used for coded data elements*
- *Would have been more costly without MIL-STD-973 and TD/CMS*
- *Would have saved almost all of that cost had MIL-STD-2549 been available*

# *MIL-STD-2549 Implementation*

- *JTA & JTA-A requires use of MIL-STD-2549 as a Product Data Interchange standard*
- *Army Automated Configuration Management System (ACMS) Performance Specification requires input/output through MIL-STD-2549.*
- *Army Materiel Command (AMC) Contractor Integrated Technical Information Service (CITIS) policy requires compliance with the ACMS Performance specification, which in turn utilizes MIL-STD-2549.*
- *DOD cooperative Product Data Interoperability (PDI) effort makes use of MIL-STD-2549 Data Information Packets (DIPs) and will develop Application Transaction Set (ATS).*
- *Need to update to correct errors and deficiencies*

# *Conclusions*

- *Army has and will continue to have a significant CM workload for many years.*
- *CM of new systems is moving towards contracting out, but legacy systems will stay with us.*
- *Current CM and product data repository systems are inadequate and in need of replacement. ACMS will be that replacement.*
- *Interface standards/approaches must address "conveyance" and "content". MIL-STD-2549 provides data models and definitions needed for content interchange.*
- *Without commonality at the data element level, the DoD, and the components and Defense agencies, will not attain an enterprise IDE .*
- *Benefits will be realized by DOD and industry*